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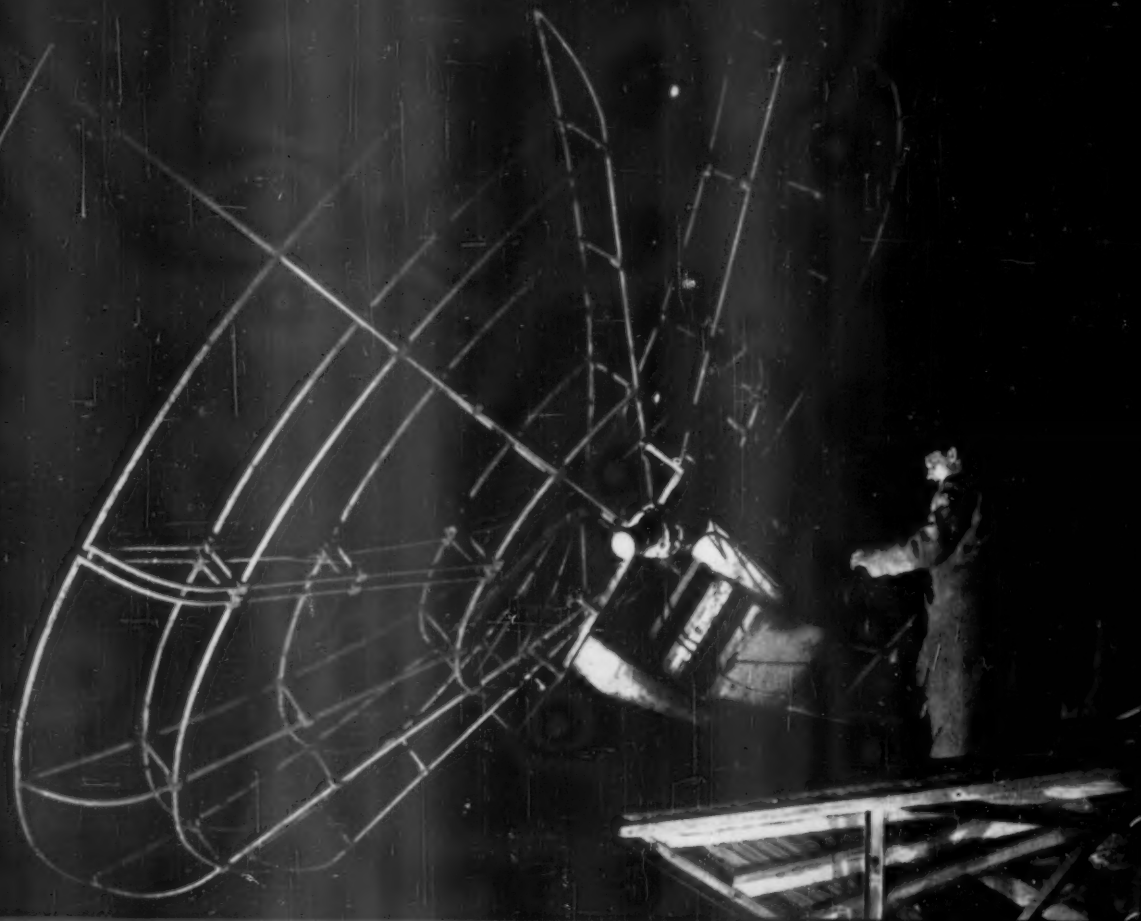
December 18, 1954

VOL. 64, NO. 25

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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Heavenly Search

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A SCIENCE SERVICE PUBLICATION

PSYCHIATRY

Mental Depressions

► UNCONSCIOUS MEMORIES of coming out second best in childhood rivalry with other children, including the Christ Child, bring on attacks of mental depression in adults at Christmas time.

This explanation for "Christmas neurosis" was given by Dr. L. Bryce Boyer of Berkeley, Calif., at the meeting of the American Psychoanalytic Association in New York.

"Throughout Christian lands," he reported, "depressions are frequently associated with Christmas."

Findings in a study of 17 patients treated with psychotherapy or psychoanalysis and who suffered from signs of depression, or melancholy, at the usually joyous Yuletide showed Dr. Boyer the reason for the Christmas neurosis.

Psychoanalysis, he pointed out, has determined that depressions occur in people who have suffered a lack of emotional nourishment during the early infantile period of their lives.

A particular mark of depression is a loss of self-esteem.

All of the 17 patients Dr. Boyer studied had suffered emotional deprivations during their early childhood. All had fared second best, or felt they had, in rivalry with brothers and sisters for affection and attention from the parents.

At Christmas, these patients had made Santa Claus equal, in the their own minds,

with parents who gave presents. The presents were tokens of love but at the babyhood level love tokens are feedings that satisfy hunger.

"Thus, at least in America, Christmas-time was seen to be associated with a revival of old memories, unconscious to be sure, related to the infantile period of dependency for satisfactions of hunger needs," Dr. Boyer said.

"It is to be remembered that Christmas is a holiday which celebrates the birth of Christ. The majority of these patients unconsciously perceived Him to be a personal rival.

"Jesus is the incomparable child whom all members of Christendom revere. No child could satisfactorily compete with such a foe for favoritism. Hence the fact that Christmas is a celebration for Christ, reminded the patients again of unresolved rivalries with siblings, real or imaginary, in their distant pasts.

"The result of the reawakened conflicts was a loss of self-esteem based on a remembrance of love they felt they did not receive, and, according to infantile logic, did not deserve, and their feelings they could not compete with Christ as at an earlier time they could not succeed in their struggles for favoritism against their sibling rival or rivals.

"The resulting reaction was depressive."

Science News Letter, December 18, 1954

AGRICULTURE

Fight Soil Erosion

► WIND TUNNEL tests are helping farmers defend their land and their homes against wind damage.

At a "war college" in Manhattan, Kans., scientists are learning a great deal about how much protection different kinds of barriers give from the wind tunnel experiments. They set up a toy-size farmhouse and tiny trees, fences and fields in the tube in various ways, then subject them to wind-machine attacks ranging from a breeze to a gale.

Sawdust snowstorms can be whipped up. Sieved gravel simulates the kind of surface that wind is likely to encounter when it strikes the soil. Wind on the rampage not only carries off top soil, but also robs soil of moisture, piles snow in drifts and works havoc with farmhouse heating.

The wind tunnel data indicate the effects of full-scale barriers under natural conditions if proper modeling techniques are followed, N. P. Woodruff of the U. S. Department of Agriculture reports in *Agricultural Research* (Dec.).

Primary strategy in placing a barrier is to slow down wind and absorb some of its force, just as mountains, forests and other

natural objects do on a grand scale. A man-made barrier affects wind in the same way. It diverts currents of air upward, and causes a drag on the wind at approximately the same height as the barrier.

This lessens the drag on ground surfaces, lowers the prevailing surface wind speed, and creates a pool of relatively calm air within the zone of influence of the obstacle.

From the Kansas experiments, Mr. Woodruff reported, scientists have learned, among other facts, the following:

A single snow fence brakes wind velocity "considerably" to distances of four to ten times the height of the fence.

Four snow fences spaced at distances 12 times fence height catch about two and a half times as much snow as one fence, and four times as much snow as a solid wall.

A well designed shelterbelt of trees and shrubs is likely to catch more than three and a half times as much snow as the best arrangement of snow fences.

A ten-row shelterbelt near a house can cut fuel use "considerably" in a windy winter. Percentage saving on heat dwindles the farther the barrier is from the house.

Science News Letter, December 18, 1954



BETTER IRRIGATION—The distribution of irrigation water, made radioactive by rubidium, is measured along the cane line by James Silva of the Hawaiian Sugar Planters' Association's Experiment Station.

ENTOMOLOGY

Cities' Fly Problem May Be Eliminated

► THE COMMON fly's weakness for something sweet to eat may mean that it can be substantially eliminated from plaguing city-dwellers.

A year's study of the effects insecticide-sweetened baits have had on the fly population of cities was reported to the meeting of the Entomological Society of America in Houston, Tex., by J. C. Keller of the U. S. Department of Agriculture's research service.

Using insecticides made from organic phosphate compounds, diluted in mixtures of molasses, malt or sugar and water, the baits reduced the fly population at a rendering plant 99% in four hours. At a city dump, the scientist reported, control of houseflies and blow-flies ranged between 97% and 99% 24 hours after treatment.

It was also reported that on garbage and trash piles in a city slum area, daily treatment provided progressively better control until, at the end of five days, the fly population had been reduced 90% or more.

Two of the chemicals, malathion and L. 13/59, had proved effective before in controlling insecticide-resistant flies on farms, but the tests also included many new materials, such as chlorthion and an experimental phosphate, OS-2046.

Mr. Keller added that results varied depending upon where baits were used and the species of the flies. The research on ridding cities of the fly problem by using baits was done by Mr. Keller, Dr. Carroll N. Smith and H. G. Wilson.

Science News Letter, December 18, 1954

BIOLOGY

Artificial Photosynthesis

The secret of how the green leaf captures energy is near solution, and a revolution in power and food is believed near. Recent discoveries in photosynthesis point way.

By WATSON and HELEN DAVIS

► THE SOLUTION of one of the major mysteries seems near: How the green leaf captures the energy of sunshine and stores it up in the making of food.

This great problem once solved should lead to "artificial photosynthesis," that is, doing what the plant does without the aid of life.

Potentially this can mean:

A vast increase in the food or raw material supply.

A revolution or a virtual substitution for agriculture.

Factories located in tropic or desert areas, powered by sunshine.

Relocation of civilization in parts of the world removed from the present power sources of coal, oil and water power.

This is a bigger accomplishment than the release of atomic energy, although it does not seem capable of being used as a weapon.

Man has long envied the green leaf its ability to use sunlight to power its miniature chemical factory. Although each leaf makes use, apparently, of only a small percentage of the energy in the sunlight that falls upon it, the chemicals that leaves build out of water and carbon dioxide, using the sun's energy to put them together, support all the life on earth.

Natural Laws Followed

Chemists have investigated many processes carried out by living tissues and found that, one after another, they have proved to happen according to natural laws.

No particular need for a living force, such as used to be imagined, has been found once the conditions for the reaction have been fully understood. Therefore, they have believed that the final great secret of photosynthesis would one day be found.

Once found, they are sure it can be used by man-built factories to produce food and materials beyond the capacity of today's farms and gardens.

Early chemists, such as Liebig, Baeyer, Willstätter and Stoll, studied the problem of how the plant makes starch and sugar. They succeeded in learning that the plant needs water and carbon dioxide as materials to build its chemicals, and that it requires sunlight to carry out this reaction.

Using the chemical knowledge that was available to them at the time, the beginners in the study of photosynthesis wrote out equations for the simplest method they could think of that might result in the compounds they observed in the plants.

Plants were known to make a great deal of cellulose, which is wood. Cellulose is related to starch, which plants also make. So close is this relationship that cellulose may be written by the chemist as a polymer of starch, and described by the same formula: $C_6H_{10}O_5$. Combined with one molecule of water, starch becomes sugar: $C_6H_{12}O_6$.

The simplest chemical that combines carbon, hydrogen and oxygen in the same proportions is formaldehyde, CH_2O , the familiar disinfecting liquid. Therefore, said the early chemists, plants combine water and carbon dioxide to make formaldehyde.

Mistake Was Hindrance

This was a mistake, and it has hindered the understanding of photosynthesis for a hundred years. Nature is a much better chemist than early adepts in the art realized.

Simple compounds of two or perhaps three chemical elements that show a decided change in properties when they are brought together can be followed through various reactions with comparative ease. Not so in living combinations, where complex changes proceed, of their own accord, very fast.

If a chemist of long ago had been granted any wish, no matter how impossible, he might well have wished for a method of following some single atom through the changing compounds of the life cycle in some animal body or some plant.

In the early years of the present century that wish was granted. Radioactivity, first discovered in 1898, provides the seemingly impossible method by which a single atom can be tracked down. Other new discoveries about chemical behavior can be used to refine the methods of identifying the compounds in which the radioactive atoms are found.

Correct Early Errors

Photosynthesis is now being followed by these techniques that would have seemed impossible half a century ago. Many early mistakes are being corrected as a result.

It seemed obvious to early students of plant life that the oxygen, which they knew was given off by the plant, came from the carbon dioxide when the carbon of that gas was added to water to form formaldehyde. However, when chemists could use and trace different kinds of carbon atoms and different kinds of oxygen atoms, they were astonished to find that the reaction is quite different.

Three distinct processes are found to be concerned with photosynthesis. The first of these splits the water molecule in two. This is the source of the life-giving oxygen that the plant throws off into the air. This process is triggered by the mysterious green chemical, chlorophyll, lately the advertisers' darling.

Splitting the water molecule sets free hydrogen, which reacts with the carbon dioxide. This is the second process in the chain of photosynthesis reactions taking place in a green leaf. Next the hydrogen and the carbon dioxide are reworked by the living cells of the leaf. What this third process makes of them is not formaldehyde.

Each of these three processes by which the green leaf accomplishes its unique work is the object of intense study by groups of scientists at the present time. Some are measuring the energy necessary to build up and to break down each of the chemicals formed by the leaf cell.

Other groups are studying the cycle of oxidation and reduction that has to do with the plant's releasing oxygen. Other ways of doing this are known to chemists, and they are comparing one method with another to see whether, for future use, man can outsmart the plant and build a more efficient process.

The most fascinating part of photosynthesis, from the chemist's standpoint, however, is to learn how the plant goes about building up its starches and sugars. What does it start with, now that the simple formaldehyde is pretty well ruled out?

Radiocarbon as Tracer

For about 15 years, a group at the University of California in Berkeley, working under Drs. Melvin Calvin, Andrew A. Benson and James A. Bassham, have been using the radioactive form of carbon to follow the compounds created in the living leaf.

By making the time shorter and shorter between the moment radioactive carbon meets leaf and the moment chemist extracts the product with its tell-tale radioactivity, this scientific team has just discovered two of the earliest compounds in photosynthesis.

Far from being simple compounds, they are two rare and complex sugars, each combined with a group containing phosphorus. A radioactive form of phosphorus aided in making this discovery.

Phosphorus is an element that forms peculiar compounds, which are apt to interfere with chemical reactions of other elements, if present. When phosphorus is present in small amounts, as in many substances created by life processes, analytical chemists are tempted to ignore the troublesome element, and class it among the "impurities."

However, this strange, fiery substance, which can be so deadly in its elemental form, proves to be a chemical of life in photosynthesis. Capable of combining with great energy, it provides a reasonable clue to reactions theoretically impossible when

only carbon, oxygen and hydrogen were in the picture. And combined with the rare sugars, ribulose and sedoheptulose, it ties in with other chemicals, such as deoxyribose, known to lie very close to the heart of all life chemistry.

Ribose is a sugar formed of five carbon atoms to the molecule, instead of the six that make up the more familiar glucose. Ribulose and deoxyribose are close chemical relatives of the five-carbon sugar.

Heptulose is similarly akin to heptose, a seven-carbon sugar. To find such complicated forms appearing among the first products of carbon dioxide and water is very startling. The phosphorus, of course, was present in the plant tissues all the time. Early plant chemists just did not look for it, or forgot to mention it if they did.

Built To Be Torn Down

The appearance of these sugars with their odd numbers of carbon atoms is another evidence that nature works in mysterious ways, for they seem to be built up only to be torn down again.

Somewhere, however, in the cycle of building up and tearing down, a repeating reaction has been achieved by which incoming carbon can always be seized, incorporated into the moving machinery, and finally passed on to replenish the structures of the whole plant, which is always growing, changing, repairing itself, furnishing sustenance to all the so-called higher forms of life.

Yet the source of all this vital energy is being narrowed down to non-vital causes. Out of the living leaf scientists have extracted small green granules that they have named chloroplasts. They are complex structures, but they are not even as much "alive" as the enzymes.

Living Structures Eliminated

Drs. Daniel I. Arnon, M. B. Allen and F. R. Whalley of the University of California in Berkeley report in *Nature* (Aug. 28) how they made chloroplasts carry on photosynthesis without the aid of more complicated living structures.

These scientists have, moreover, found chemicals that will stop each of the processes of photosynthesis singly or in combination, so that the man in the laboratory can separate or combine the plant processes at will, and see what happens.

With the knowledge of how to do this, other scientists working in similar fields are making haste to apply these findings to their own photosynthesis problems. The goal of controlled photosynthesis is almost in sight.

Science News Letter, December 18, 1954

The eyes of an *ostrich* often weigh more than twice as much as its brain.

Japan leads the world in fisheries production, with an average of almost 3,000,000 metric tons of fish a year, the United States is next with 2,500,000 and Russia is third with 2,000,000.

GENERAL SCIENCE

1954 Carnegie Report

Annual report tells of discovery of fall of Mayapan, which is likened to destruction of Troy. Also notes progress in astronomy, sex reversal and probing fossil records.

► DISCOVERY OF the sacking and burning of Mayapan, the last great city of the pre-Columbian Maya civilization of Yucatan, Mexico, about 1450, resulted from excavations announced in the annual report of the Carnegie Institution of Washington.

This confirmation of events described in old pre-conquest records "parallels in many ways the archaeological verification of the Homeric account of the destruction of Troy," Dr. Vannevar Bush, president, told the trustees at their annual meeting.

In the ruins of the same city, a mural painting done on plaster in colors was unearthed. Heads of monsters were painted in green, red, yellow, white and blue against a black background.

Houses of ordinary people, which were previously neglected because of concentration upon the striking Maya temples, were found in Mayapan in such numbers that the city must have been large in the ancient days, even in terms of present-day Yucatan.

Mammalian Sex Reversal

The first sex reversal accomplished in the mammal male was reported by Dr. Robert K. Burns of the department of embryology.

This is declared to be of great importance for the study of sex differentiation in higher animals. Using the opossum, in which embryonic animals are accessible in the mother's brood pouch, he obtained by injection of sex hormones the reversal of the primary sex organs of male opossums.

Spot Proteins in Fossils

Fossils as old as 360,000,000 years can still be analyzed for their building blocks of protein, amino acids, Dr. Philip H. Abelson, director of the geophysical laboratory, discovered.

This discovery opens the opportunity for investigating the bodily chemistry or biochemistry of creatures long extinct.

Some of the amino acids, identical with those in present-day proteins, that were found included alanine, glycine, valine, leucine, aspartic acid and glutamic acid.

Because experiments showed that the rate of breaking-down of the amino acids increased with temperature, scientists may be able to use fossils as a recording geological thermometer for sediments.

Spiral Arms Young

Observations with the 100-inch telescope of Mt. Wilson Observatory upon stars both in the inner and the outer region of our Milky Way and in the similar Andromeda galaxy showed that the stars in the outer

spiral arms were formed late in the history of the galaxies, from the huge clouds of dust and gas existing there.

The stars nearer the center of the galaxies are believed to be nearly as old as the galaxies themselves.

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Telescopes will go electronic instead of photographic as now if a study conducted by the Carnegie Institution of Washington, the National Bureau of Standards, U. S. Naval Observatory and the California Institute of Technology is successful.

The photographic method used by the larger telescopes is limited by the inability of photographic emulsions to store useful information beyond a certain point.

This limit is set by the ever-present glow of the night sky and the focal length of the telescope. A committee is considering the possibility of applying to astronomical observations some sort of image storage tube adapted from television-like techniques.

Structure of Nucleus

Much has been found out about the heart of atomic elements by bombarding them with charged helium atoms of relatively low speed and energy.

In the Department of Terrestrial Magnetism research, the atoms do not actually crash into each other. The electric field of the passing particle merely sweeps the atomic nucleus into an excited quantum state, from which it recovers by emitting a gamma ray.

Measuring the gamma radiation with scintillation crystals locates the energy levels in the nucleus, which is valuable basic information about the elements.

Cosmic Ray Variation

A variation in cosmic rays, correlated with the sunspot cycle, has been discovered through continuous measurements at four points since 1937.

The report suggests that the same mechanism may also be responsible for an 11-year variation in the earth's magnetic field. Cosmic rays may be localized or even trapped in orbits in our solar system.

Such a theory involves assumption of extensive magnetic fields in large regions of space.

Atmosphere of Mars

A marking on Mars resembling the letter "W," which moves at about the same speed the planet rotates, was discovered on motion picture films taken during its close approach early last summer.

The "W" marking was near the Martian equator and is presumably a "cloud formation in the upper atmosphere of the planet," the Carnegie Institution of Washington revealed in its annual report.

The fact that the letter "W" is sometimes taken by people to stand for "war" is completely without significance in this case, Dr. Ira Bowen, director of the Mount Wilson and Palomar Observatories, said.

It was chosen as a "convenient letter" roughly similar to the formation. The spread of the "W" was measured as 1,100 miles from tip to tip.

The marking shows only in photographs taken in blue light, not on those taken in yellow light on the same nights. The

yellow-light films do, however, show other markings "easily visible on dozens of exposures" at about the same position as several of the well-known canals.

These, presumably, are surface markings, but the report notes that they appear as "irregular streaks or broad bands rather than as the lines shown on most drawings and maps of the planet."

A new formation in a region often shown as blank was also spotted on the movie films taken by Drs. Edison Pettit and Robert S. Richardson, astronomers of Mount Wilson and Palomar Observatories. The area appeared as a dark blue-green sea that "seems to be a development of the fine complicated structure northeast of the Syrtis Major," a patch visible with a small telescope.

Photographs of Mars in blue light are usually featureless except for bright caps over the poles. Occasionally, however, the atmosphere becomes exceptionally transparent in blue light, so that the surface markings can be seen.

These "blue clearings," as they are known, have previously been thought to be sudden occurrences, but this year's observations showed that they are a phenomenon that takes place gradually rather than abruptly.

Science News Letter, December 18, 1954

NUTRITION

Dehydrofreezing Tested

► SCIENTISTS HAVE added a new process to the food-preservation industry and, at the same time, given the American housewife a new word, dehydrofreezing.

Developed by Government food technologists, dehydrofreezing combines the space- and weight-saving qualities of dehydration with the convenience and flavor-retaining qualities of freezing. Dehydrofrozen apples, for example, have been found to have a much firmer texture when thawed, and to have made better pies than apples frozen in the ordinary way, the scientists report.

Ordinary freezing, the technologists point out, tends to rupture cellular structure, causing many fruits and vegetables to break down when thawed. Partial dehydration prevents much of the initial rupturing. In addition, dehydrofrozen foods retain just the right amount of moisture.

The dehydrofreezing process works in five basic steps: conventional preparation of the food for canning or freezing; an inactivation of the enzymes "to prevent browning; rapid drying; packaging and freezing, and storing at zero degrees Fahrenheit.

Dehydrofrozen foods can be reconstituted simply by cooking or soaking in water. Fruits and vegetables now being dehydrofrozen, the U. S. Department of Agriculture scientists who developed the process report, include apples, apricots, peas and pimientos. They also state that six commercial firms are now employing the process.

WILDLIFE

Three Cranes Missing; Fear Population Decline

► THE POPULATION of America's rarest and tallest bird, the whooping crane, may have been reduced by three this year.

Although it is still too early to definitely determine the bird's total population, three whooping cranes have failed to return to the Aransas Wildlife Refuge in Texas.

The U. S. Fish and Wildlife Service reported that, in April, 24 birds migrated north, and, to date, only 21 have returned to their winter quarters.

Conservationists are even more concerned about the fact that no young have been identified in the 21 birds that have returned south. There is still hope, however, that the three missing birds will show up and, possibly, bring young birds.

The Service stated that a final count has been planned for late in December, but that if the three birds are still missing by then, the final count may be delayed.

Each year, in the spring and in the fall, the whooping cranes are carefully surveyed by conservationists in the United States and Canada. The count of the Aransas Wildlife Refuge is carried out by aerial survey.

Science News Letter, December 18, 1954

Dehydrofreezing is available for public use through a patent issued to the Secretary of Agriculture, the Department reports in *Agricultural Research* (Dec.).

"Estimates based on these experimental studies indicate that the processing cost in dehydrofreezing is somewhat greater than in freezing. But lower packaging, freezing, storage, and distribution costs should result in overall saving to users," the food specialists conclude.

Science News Letter, December 18, 1954

CHEMISTRY

New Amino Acid in Apple Peel, Not Pulp

► HERE MAY be another reason for eating the peel as well as the pulp of apples:

The peel, but not the pulp, contains an amino acid, one of the so-called protein building blocks.

Discovery of the acid, which has apparently not been found previously in plant material, is announced by Dr. A. C. Hulme of the Department of Scientific and Industrial Research, Maidstone, Kent, England, in *Nature* (Dec. 4).

The acid was isolated, by using a series of ion-exchange columns, as fine, silky needle crystals. Dr. Hulme believes, on the basis of chemical tests so far, that the new acid is a methyl-hydroxyl-proline.

Science News Letter, December 18, 1954

GENERAL SCIENCE

Top 1954 Science Events

► THE TOP important advances in science and technology during 1954 as picked by Watson Davis, director of SCIENCE SERVICE, are:

1. Conversion of atomic energy radiation directly into electricity, and the development and application of solar batteries turning sunlight into electricity.
2. Demonstration of photosynthesis by non-living green grains extracted from plant cells, and the elucidation of the role of complex sugars and phosphorus in the photosynthetic process.
3. Mass trials of a polio vaccine on one and a half million school children.
4. "Pogo" fighter plane that takes off straight up and lands tail-first.
5. Use of naturally-radioactive tritium to trace age of water in rain and elsewhere.
6. Structure of the center of the Milky

Way, our own stellar galaxy, revealed by radio waves generated by the hydrogen gas filling space between the stars.

7. Rising apprehension that radioactive material from atomic and H-bombs will poison the earth's atmosphere and affect the continuance of human life.

8. Discovery that corn is at least 60,000 years old and native to the Western Hemisphere.

9. Revoking of the security clearance of Dr. J. Robert Oppenheimer and similar cases which affected adversely the relationships of scientists to government.

10. The successful use of the international language, Interlingua, for abstracts at world medical meetings and in scientific journals.

Science News Letter, December 18, 1954

• RADIO

Saturday, Dec. 25, 1954, 5:00-5:15 p.m., EST

"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio Network. Check your local CBS station.

Watson Davis will discuss "Traditions of Christmas."

AERONAUTICS

Controlled Thrust Of New Rocket Engine

► THE FIRST rocket engine in the United States that a pilot can speed up or slow down at will has been completed.

The thrust of the new engine, developed by Curtiss-Wright Corporation, Wood-Ridge, N. J., is varied by proportioning and controlling the fuel. The engine can also be stopped or started from the cockpit. Its thrust power was not revealed.

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PHYSIOLOGY

Spot Brain Area Influencing Behavior

► DISCOVERY THAT regulation of blood circulation and expression of feelings through behavior are influenced if not controlled by a finger-tip sized structure on each side of the brain, has been announced by a Harvard Medical School research team.

They are trying to control assaultive behavior of three very sick epileptics by electrically coagulating this brain area to destroy it.

The brain structure is called the amygdaloid nucleus. It is located in the temporal lobe on the side of the brain. Because the findings were made with electrodes in the brains of living patients, the scientists could not be sure the brain cells they stimulated were exactly those making up the amygdaloid nucleus. So they give the location as the amygdaloid nuclear region.

Electric stimulation of this region had the following effects: In four patients feelings of fear, anxiety and, at times, a "weird" or "terrific" feeling were produced. With slightly more intense or longer stimulation, patients were momentarily confused and unresponsive. They had trouble counting and performing skilled acts such as winding a string around a pencil.

In three patients, both eye pupils were dilated and heart rate was increased 20% to 100%. In two, there was considerable rise in blood pressure.

Results of the electrocoagulation of this area are not yet ready for reporting because it is too soon to tell how much the treatment has done for the patients.

The studies are reported in *Science* (Dec. 3) by Drs. William P. Chapman, Heinz R. Schroeder, Georg Geyer, Mary A. B. Brazier, Charles Fager, James L. Poppen, Harry C. Solomon and Paul I. Yakovlev.

Science News Letter, December 18, 1954



POGO TAKES OFF — Here is Convair's XFY-1 Navy fighter taking off straight up. When this "Pogo" lands, it comes down tail first on the four casters set into the tips of the delta wing and fins.

GENERAL SCIENCE

1954 Science Review

Top achievement of past year may be beginnings of direct production of electricity by atomic radiation. Mass trial of polio vaccine and scientific insecurity also noted.

This summary of the year's happenings in the world of science is limited by space to just the highlights. Most of the events are described in detail in the pages of SCIENCE NEWS LETTER for the current year. If you wish to refer to any particular report, you may find it readily through the index. (See SNL, June 28, and also the issue which will appear next week, Dec. 25.)

By SCIENCE SERVICE STAFF

See Front Cover

► THE YEAR 1954 in historical retrospect may be noted for man's first approaches toward converting atomic energy directly into electricity, or the first practical use of solar batteries converting sunlight directly into electricity.

Atomic and solar batteries are still inconsequential for power purposes. The Dixon-Yates power controversy involving the AEC, although fundamentally unconcerned with the matter of atomic power, overshadowed the research developments or even the continual progress toward atomic power plants.

Of great importance in the world's future energy and food supply is the progress made during 1954 in the understanding of the mechanism of photosynthesis and the demonstration of the process in non-living material extracted from the plant.

Perhaps this will lead to a way of capturing the sunshine's energy outside the green leaf. An industrialization of this process would bring power to areas of the world now barren of available energy.

The cigarette came under indictment, upon circumstantial evidence, as increasing the death rate not only from lung cancer but from all forms of cancer and from coronary artery disease. A statistical study of men ages 50 to 70 showed that the death rates of heavy cigarette smokers, meaning a pack or more a day, more than doubled for cancer and nearly doubled for coronary disease, compared with non-smokers.

Public reaction was marked and the whole question of the use of tobacco came under renewed inquiry.

Mass trials of a vaccine against poliomyelitis were made upon a million and a half school children, but whether it works or not will not be known until next year. Experts, however, are pretty well agreed that the mass inoculations, beginning in 1953, with a different substance, the gamma globulin blood fraction, had no beneficial effects on the spread and severity of polio.

In aviation, the greatest progress may have been in the field of guided missiles, much of it under cover of necessary mili-

tary secrecy. Various kinds of rocket and jet missiles for intercepting and for attack went into service. The U. S. Air Force completed the conversion of its fighter wings to jets.

Most spectacular development in flying was the new-type plane, called Pogo, that takes off straight up and then lands tail first, obviating the necessity of large landing space. Applicable to fighter planes, its first use will be by the U. S. Navy since space aboard ships is at a premium.

There is also a convertiplane that uses the helicopter principle to take off vertically and then flies forward in a conventional manner.

The exploration of the heavens made progress, particularly through use of the relatively new techniques of observing radio waves from outer space. Such radio radiation generated by hydrogen gas filling the space between the stars was observed and studied, giving information about the structure of the center of the galaxy in which our solar system is located, the Milky Way.

Shown on the cover of this week's SCIENCE NEWS LETTER is the 17-foot radio telescope set up at Sydney, Australia, by the Commonwealth Scientific and Industrial Organization. A double exposure was used to get the stars and antenna separately.

An as yet unsuccessful search for little "moons," or earth's satellites too small to be seen, gave scientists hope that such a natural space platform might be found. Such an observing post, if discovered and reached by rocket, might dominate the world militarily. Less ominously, it would be an observatory beyond the earth's atmosphere that could add much to astronomical knowledge.

Exploding atoms, or radioactive isotopes, are important tools of investigation. One of these atoms is tritium, the triple-weight form of hydrogen. It is generated by cosmic rays in the upper atmosphere, and combines there with oxygen, falling as water.

Tritium decays at such a rate that half disappears in 12.5 years. This has allowed the determination of the age of rain as three weeks. On the average, moisture stays aloft that length of time. Wherever geologists and meteorologists want to date water, the tritium method is used. They have found that rain mixes with ocean water to a depth of only about 150 feet.

The exploration of man's antiquity continued. In the Western Hemisphere, radiocarbon dating showed that man has lived in the New World for more than 23,800 years, the limit of such dating, instead of

about 12,000 years, as previously thought.

A human skull, at least 12,000 years old, and possibly much older, was found associated with animal fossils near Midland, Texas. A rock shelter occupied nearly 11,000 years ago was found in Illinois. It was pronounced the oldest dated Indian home east of the Mississippi.

In the Old World, archaeologically-splendid Egypt produced a solar boat built to carry the Pharaoh Cheops to heaven. Possibly the oldest home in the world, a cave continuously lived in for as much as 150,000 years, was explored in Iraq.

Preparations were made among the nations for the International Geophysical Year, a period in 1957-58 during which expeditions and observations will record and investigate many aspects of the earth, oceans and atmosphere.

The issue of security in government work created a large amount of insecurity among scientists. The revoking of the AEC security clearance of Dr. J. Robert Oppenheimer, and similar reinvestigations of numerous scientists who have contributed materially to atomic energy and other defense research, caused concern in scientific circles and more reluctance to engage in classified government research.

Federal grants for non-secret fundamental research were withheld from some investigators with liberal tendencies.

Denial of visas to visit the United States of foreign scientists who had been invited to attend scientific meetings here caused an adverse effect abroad upon the U. S. reputation for democracy and fair play. Similarly, denial of passports to some U. S. scientists for trips abroad interfered with normal international flow of scientific interchange.

The barrier of language in scientific and medical communication was lessened by the successful use of Interlingua, the new international language, in a dozen journals and several international conferences, primarily for abstracts of medical and technical papers.

Interest increased in the problem of increasing the number of scientists, engineers and technologists available to our civilization for industry and defense.

The rate of producing well-trained scientists and engineers was reported to be higher in the Soviet Union than in the United States, although the United States still leads in numbers actually at work: 500,000 engineers and 200,000 scientists in the U. S., compared with about 400,000 engineers and 150,000 scientists in the Soviet Union.

A survey showed that half of the most promising seven percent of the nation's youth do not go to college, a waste of human resources.

Significant advances were made in interesting high school youth to do science projects for exhibit in science fairs, a method of encouraging potential participation in science and technology. The number of science fairs at various localities rose above 50.

Science News Letter, December 18, 1954

AERONAUTICS

Straight Up Take-Offs Made Successfully

Fighter planes that take off straight up and land tail-first successfully passed Navy tests, making possible extensive air defense without large, costly and vulnerable landing fields.

The U. S. Air Force finished outfitting all of its fighter wings with jet planes.

Vigorous, sustained attacks were made on the formidable technical problems involved in harnessing nuclear energy for aircraft propulsion with a view to making possible nonstop supersonic flight to any point in the world and return.

The Air Force B-61 Matador guided missile was successfully packaged in interchangeable sections to facilitate storage, shipping and operation.

America's first jetliner was test flown, and the Air Force ordered production of its military equivalent.

A new type of Navy plane with unusual "coke-bottle" fuselage took to the air.

A convertiplane was announced that uses a helicopter rotor to take off vertically, and then flies forward pushed by a conventional airplane engine.

A navigational compass that works on the sky's polarized light was developed for use by commercial airlines flying in the Arctic twilight.

Radar tested in airliners promised improved service and comfort in stormy weather.

A 600-mile-an-hour trainer plane for jet pilots has been developed to give students the feel of "swishy" flying without sacrificing the safety of slow-speed training planes.

A radar-type altimeter was developed that tells a pilot instantly his height above ground, warning him of decreased clearance as he nears mountain peaks.

A push-button parachute system was perfected that enables a transport pilot to drop as much as 20 tons of cargo.

A plane with half-barrel-shaped dips in its wings was successfully flown at only 11 miles an hour although it can top 180.

Brakes for jet planes, using reverse engine thrust, were developed as an alternative to longer landing strips.

An electronic machine was devised to help solve the problem of holding of aircraft over heavily used airports; it helps in guiding planes into the final approach at 30-second intervals.

A jet engine test laboratory was built that can simulate temperatures and atmospheric conditions from sea level to 80,000 feet.

A slimmer parachute pack, requiring half the space of earlier types, will make it possible to reduce by \$3,000 the cost of Navy fighter planes.

Gales of 12,000 miles an hour, about 16 times the speed of sound, were reached in a hypersonic wind tunnel.

Carefully placed rockets can snap a plane out of a tailspin in an emergency, it was demonstrated.

An accurate navigational system was developed that permits a helicopter pilot to land within arm's reach of a dime.

A floating heliport that can be placed on flat-topped office buildings without reinforcing the building's frame was tested.

A small booster motor was developed to permit helicopters to lift heavier loads in mountains where the air is thin.

An unofficial world helicopter altitude record of 24,500 feet was set in Sikorsky XH-39 by the same flyer who previously set an unofficial helicopter speed record of 156,005 miles an hour.



SPEED'S EFFECT—When a man comes to a rapid stop from the unmatched ground speed of 421 miles per hour, this is how the 22-g deceleration distorts his face. Recorded by a high speed camera, the face in both pictures is that of Lt. Col. John P. Stapp, U. S. Air Force aero medical research scientist, in the rocket-propelled sled at Holloman Air Development Center. The left picture was taken before the start; the right one, at the peak of the deceleration.

The highest speed on the ground was attained—421 miles per hour—in tests aimed at making supersonic bailouts safer.

A 616.208 miles-an-hour speed record was set Sept. 4 between Edwards Air Force Base, Calif., and Dayton, Ohio, in a Republic F-84F, thus winning the Bendix Trophy Race.

A new National Aircraft Show speed record over a 100-kilometer course was set Sept. 3 at 692.823 miles an hour in a North American F-86H, winning the Thompson trophy.

The U. S. already has all the know-how for launching a small earth satellite, or artificial moon, for a flight of limited duration, it was stated.

Scheduled commercial airline flights were started over the once hazardous Arctic between Copenhagen and Los Angeles.

ANTHROPOLOGY-ARCHAEOLOGY

Two Important Finds Made in Egypt

Two very important finds were made in Egypt: one of the solar boats intended to carry the Pharaoh Cheops to heaven, and a new step pyramid at Sakkarah containing an apparently undisturbed golden alabaster coffin, at first believed to be that of Pharaoh Sankhet but which turned out to be empty.

The most ancient American skull, at least 12,000 years old and possibly much older, was found near Midland, Texas, in association with ancient fossil animal bones and Folsom points.

Remains of a 208-house Arctic village occupied by the vanished Dorset people for a period of at least 2,000 years before the coming of the Thule Eskimos were found north of Hudson Bay in Canada; the houses were large and rectangular, heated by stone indoor fireplaces and lighted by small lamps.

Tiny stone tools, with microscopic cutting edge, were made by flaking off another small engraving tool called a "burin," and used in quantity by a prehistoric Arctic people to carve on ivory, it was reported.

Evidence was found on Cornwallis Island of two early waves of migration from Alaska across the Canadian Arctic to Greenland, the earliest being of the Dorset people, who were followed after a long interval by the Thule Eskimos.

Positive confirmation for the existence of man as a hunter of now-extinct mammoths in prehistoric Mexico was unearthed near the Texpepman site when fossilized bones of a mammoth were found with the stone weapons that felled the beast.

Examination of the Australopithecine sites in South Africa indicated that these ape-men were not tool-makers, and were not old enough geologically to be ancestors of the first tool-makers with whom they may have lived contemporaneously.

A pleasant cave home with southern exposure in Iraq was explored and determined to be one of the oldest continuously inhabited homes in the world, having been lived in since 70,000 or, possibly, 150,000 years ago.

Artists' tools used by a previously unknown people who lived in the Old Stone Age, just after the days of Neanderthal Man, were found in Shanidar Cave in northern Iraq.

A rock shelter occupied nearly 11,000 years ago was found in Illinois and determined to be the oldest dated Indian home east of the Mississippi.

Evidence was reported to indicate that two great migrations, one of men and their new ideas about 1,000 B.C. and the other of ideas alone about 2,000 years later, were responsible for the cultural development of the native people of eastern and midwestern United States.

Two stone images of seated figures, the style of which suggests strongly a link between the Etowah people who made them and the ancient Aztecs of Mexico, were found in Georgia.

The condition of the breast bone of the human skeleton was found to indicate the age of the individual at time of death, provided he was a child or young adult—an aid in identifying war dead.

A tabulation of body size of aboriginal inhabitants of North and South America showed that people tend to be larger with distance away

from the tropics, but decrease in size within the Arctic regions.

Excavations for a new block of buildings in the city of London revealed ruins of an ancient Roman temple containing interesting art and religious objects that included sculptures of the heathen god Mithras and the head of a Roman youth.

At Pompeii, a large cemetery of early Christian times was discovered and four villas were opened; finds included a statue of Venus wearing a two-piece costume similar to a Bikini bathing suit.

The largest terra cotta vase ever found—four feet, eight inches tall and decorated with scenes from Greek mythology—was excavated near Athens and assembled from 228 fragments.

Ten houses of a small settlement estimated to be at least 5,000 years old were excavated near Beersheba; below the floors were silos containing wheat, barley, grape seeds and lentils, and evidence of trade in copper was also found.

Eleven stone plates of an ancient lithophone were found in Viet-Nam and attributed to the Bacsonians, a tropical group who lived in Indo-China 5,000 to 8,000 years ago; assembled in Paris, the plates were found to resemble a modern xylophone.

The level of development of a culture was found to be directly dependent on the agricultural potentiality of the land occupied by the people.

Discovery was announced of a hundred-mile-long canal system paralleling the Euphrates River in ancient Mesopotamia that was used for navigation and water supply six or seven thousand years ago.

Realistic "family portraits" modeled in plaster on bases of human skulls were found in the

ancient city of Jericho, where they were left by a people who lived there before men made pottery, probably 8,000 years ago.

Rare and spectacular gold ornaments of the Chimu period, 400 to 700 years ago, were found in a Peruvian grave of a man who was apparently a goldsmith in life, along with a gold slab suitable for use in the "cire perdue" process.

Evidence was found in a rock shelter in the Dordogne region of southern France for a change in ancient man's diet from 25,000 years ago, when horse meat was the principal feature of the menu, to 18,000 years ago, when reindeer had replaced the horse.

Restudy of the people in a South Pacific village who had been observed as children 25 years ago showed a dramatic social change from Stone Age to Atomic Age in a single generation.

Evidence was found on Japan's north coast of a vanished people who never suffered from tooth decay.

A new and romantic branch of archaeology, "sea digging," was advanced with the salvage of archaeological treasures from ancient sunken ships off the coast of France.

Man has lived in America for much longer than the 10,000 to 12,000 years thought previously, it was proved by radiocarbon dating of charcoal of human origin from Tule Springs, Nevada, at 23,000 years and from Sandia Cave, New Mexico, at 26,000 years.

ASTRONOMY

Radio Waves Show Milky Way Structure

For the first time, radio waves generated by interstellar hydrogen were used to reveal the structure of the Milky Way galaxy toward the center.

A systematic search was begun for small satellites that may be circling the earth and could serve as platforms for space ships and scientific observations.

Plans for a radio telescope observatory, to be operated jointly by several universities, were discussed.

An advisory panel for the proposed national astronomical observatory was appointed, part of the extensive and valuable program of support for astronomical research by the National Science Foundation.

Investigation was begun of methods for exploring at least twice as far into space as now possible by finding new methods combining photography and electronics.

Astronomers borrowed from aeronautical engineers the shock tube, used in design of guided missiles, to duplicate in the laboratory temperatures found in the sun and other stars.

Several new radio stars were discovered, including three very intense ones with nebulosities. Using very sensitive radio telescopes, a search was made for deuterium in space between the stars.

Twin stars, born some 2,600,000 years ago, were spotted in the Orion Nebula, thus giving evidence to support the theory of current stellar creation.

The first phase of a sky-mapping project that will, about 1960, give the true rotation and mass of the Milky Way was completed.

The list of stars with appreciable motion was increased by 19,000.

A large number of slowly brightening, flare-like stars in the nebulosities of Orion were discovered and measured.

The study of radial velocities, or red shifts, of 580 galaxies was completed.

A color-magnitude array, reaching to stars of

less candle power than the sun, was completed for the globular cluster Messier 3.

Direct evidence was found that particles are ejected from the sun with speeds up to one-fifth that of light; these particles can provoke changes in the earth's weather, it was reported.

A new theory was advanced to account for both the "canals" and dark green markings on Mars as wind-blown streaks and patches of volcanic dust.

Evidence was found that the sun's visible surface, or photosphere, has a circulation which causes changes in the rate of its rotation at the solar equator.

A telescope was built from a new design having a reflector-corrector lens attachment that permits wide-angle photographs on flat plates.

It is now possible, it was announced, to make an artificial meteor trail in the heavens by spraying sodium from a man-made satellite, thus providing scientists on earth with a picture of winds, turbulence and temperatures in the upper atmosphere.

The patterns formed by whirling disks in liquid metals, placed in powerful magnetic fields, were used to study the forces at work in the solar system.

A new Pulkovo Observatory, built in Russia on the site of the war ruins of a world-famous institution, was dedicated with an important international scientific meeting that was attended by two American astronomers.

A total eclipse of the sun on June 30 was observed on a wide front; a ten-station program of the U. S. Air Force distributed observers all the way from Ontario through Labrador, Greenland and Scandinavia to Iran.

Temperature of the sun's corona may be even higher than 1,000,000 degrees Centigrade, it was indicated when the yellow emission line caused by calcium atoms stripped of 14 electrons was observed.

A unimagnetic pole on the sun's surface was found to be linked with geomagnetic activity on the earth.

A three-year tracking was completed of a solar "M" region, which returns in 27-day cycles, causing geomagnetic storms on earth.

First direct observational evidence showed that Jupiter's atmosphere consists mainly of hydrogen and helium, not methane and ammonia as was previously thought.

Mars approached on July 2 to within 39,740,000 miles.

Seven new comets were sighted in the sky, and five periodic comets were re-observed.

Five novae, or exploding stars, and three supernovae were observed during the year.

An asteroid, Athalia, was rediscovered after having been lost for 50 years.

BIOLOGICAL SCIENCES

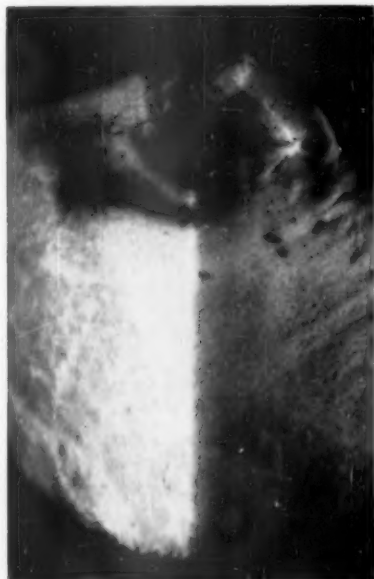
Corn Found a Native Of Western Hemisphere

Corn is a native of this hemisphere and has been grown here for at least 60,000 years, study of fossil pollen from 200 feet below Mexico City showed.

An ancient puzzle to botanists was solved when it was found that fat is produced in the chloroplast, site of photosynthesis; details of the chloroplast also showed up in photographs made with the electron microscope.

A new theory was proposed which suggested that the process of photosynthesis is essentially a photoelectric current flowing from water through the chlorophyll to disulfide intimately associated with the chlorophyll molecule.

A chemical structure was proposed for desoxyribonucleic acid, or DNA, substance essential in the dividing cells involved in life;



17-DAY TWINS — The youngest human twin embryos yet seen are shown in this photograph of the gestation sac. The embryos are the small round objects, one on the floor, the other on the roof of the chorionic cavity which is the dark spot near the top of the picture.

this points the way to solution of the fundamental problem of how life is handed on.

The B vitamins in a grain of wheat were found to be concentrated in a single one of the outer layers.

A single electron such as hits a television picture screen has enough energy to keep a single bacterium moving for about three minutes, it was calculated.

Four generations of fatherless female desert locusts were produced in the laboratory.

A plant absorbs its nutrients from the soil at a point just above the tip of the root, where root hairs are present, a fact revealed when plants were fed radioactive nutrients and then radiograms made of the plants.

Natural plant hybridization produced plants, found in north central Tennessee, that do not resemble either parent after many generations.

Disease-causing fungi were found to have chitin as the material for the skeleton of their cell walls.

Bull frogs were found to show great resistance to sarin, a nerve gas, surviving more than a thousand times the dose that would kill a man.

An international expedition marked whales so that more could be learned about the rate of interchange between whale populations of different regions, the age and rate of growth of whales, and the ratio of number killed to total population.

Two new cattle diseases, an influenza-like ailment and sporadic bovine encephalomyelitis, were reported to present threats to human health.

Carbon of living origin found in Canadian slates of early pre-Cambrian time, or 2,500,000,000 years ago, pushed back the estimated time of life's beginning.

A new plant genus with a green and purple flower, belonging to the family *Umbelliferae*, was discovered in northeastern Mexico.

Rabies vaccine for cattle was made available.

New insecticides were developed that can be safely fed to cattle to destroy their parasitic grubs.

Chemical extenders added to present insecticides were found to prolong their effectiveness to an entire season.

DDT-resistant flies developed through survival of the fittest; it was found that the resistant insects are capable of developing an enzyme chemical that serves them as an antidote to the poison.

Infestations of the Khapra beetle, a stored-grain destroyer native to India, Ceylon and Malaya, were reported in 11 counties in California, Arizona and New Mexico; apparently it invaded the United States in 1946, but remained undetected for seven years.

An insect pest, attacking cotton in Texas and known locally as the brown cotton leafworm, was identified as *Acontia dacia* Druce.

America's citrus industry was declared seriously threatened by a nematode called "spread-ing decline."

The Mexican fruit fly made a new invasion into California.

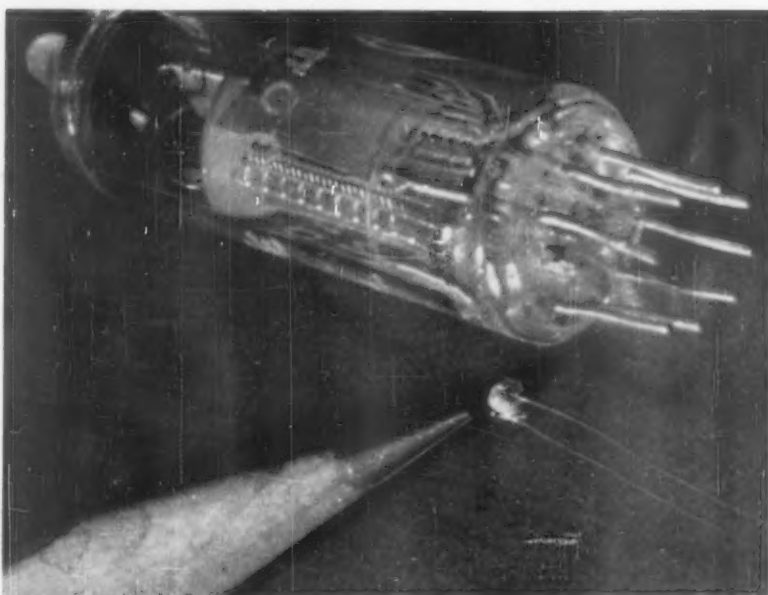
Atomic radiation was found to cause cancer growth in tobacco.

A new virus disease threat to the brain and nervous system of dogs was discovered in Australia.

Research attacks on a sheep disease, blue tongue, included development of a vaccine for immunization and the discovery that mosquitoes spread the virus.

The pink bollworm, pest of cotton, continued to spread throughout the South and was attacked by biological warfare in the form of a virus disease of the insect.

Compressed air was forced to the bottom of



MIDGET RECTIFIER—The tiny object under the pencil point is a germanium-rectifier made by a disc of indium fused to a rectangular bit of germanium. It has no filament to burn out and no glass tube to break, as does the vacuum tube shown for comparison. It can be used to operate hearing aids and other subminiature devices.

ice-bound lakes, bringing the warmer water at the bottom up to melt the ice and prevent winter-kill of fish.

Three rare birds threatened with extinction were reported increasing in numbers—the whooping cranes, the trumpeter swans and the Hawaiian nene.

CHEMISTRY-PHYSICS

Convert Atomic Energy Directly Into Electricity

Atomic energy was converted directly into electricity by using high-speed electrons emitted by strontium 90 to bombard tiny transistors which, in turn, emit large numbers of slow-moving electrons to give a very small electric current.

An atomic battery was developed that uses thermocouples to convert the heat of its radioactive polonium core into a small voltage electric current.

A semiconductor device made of silicon was successfully used to convert sunlight directly into electricity; another solar battery was produced, using a crystal of cadmium sulfide.

Element 99 was produced by bombarding uranium 238 with stripped nitrogen atoms, and identified.

Different isotopes of element 100 were independently produced in the United States and in Sweden.

Element 43, technetium, was found to become superconductive at the relatively high temperature for this phenomenon of 11.2 on the absolute scale.

Cesium 137 was extracted from plutonium waste products and made into a 1,540 Curie source for gamma ray beam therapy.

New evidence for the atomic ghost particle, the neutrino, which has been postulated for years, was found.

Synthesis was achieved for strychnine and lignin, and a new method for synthesis of morphine used a simpler chemical as the starting point.

Steroids related to those obtained from the adrenal cortex have been synthesized with halogenated substituents and show even greater promise for clinical use than the well-known cortisone and hydrocortisone.

Discovery of part of the molecular structure of ACTH brought nearer the synthesis of this pituitary hormone.

The bevatron, 6,000,000,000-electron-volt atom smasher, started operation at Berkeley, Calif.

A small atom smasher using the strong focusing principle was under construction at Ithaca, N. Y.

Plans were made by the Atomic Energy Commission for the building of five types of large-scale reactors, and construction was begun on three of them; the types are: the pressurized-water reactor, the sodium-graphite reactor, the boiling-water reactor, the homogeneous reactor and the experimental breeder reactor.

The boiling-water atomic reactor proved to be self-regulating, so that it will not "run away," causing a disaster, experiment showed.

A transistor was successfully made from silicon, promising a cheaper replacement for the costly germanium transistor.

A new family of silicone compounds was produced when carbon was made to join silicon without oxygen as an intermediary.

An axicon, a universal-focus lens, was produced; in the form of a glass cone it is suitable for use in a telescope to bring objects distant from each other into focus simultaneously.

Discoveries were announced of a fourth and fifth type of abnormal adult human hemoglobin that differ from the normal variety in ways similar to those that differentiate the hemoglobins of patients with sickle cell anemia;

chemical bases for these differences were elucidated for three of the adult forms.

Using isotopes, discovery was made of the steps by which nature produces rubber in the growing plant, an advance toward producing the equivalent of natural rubber.

A new laboratory was dedicated having apparatus for radiocarbon dating by a new gaseous method that is more accurate and covers a longer time scale.

A gap was filled in the electromagnetic spectrum by the generation of millimeter waves, about six-thousandths of an inch long, which fall between the microwaves that carry television programs and the shortest waves of infrared radiation.

A twin birth was announced for the world of the atom when it was found that the relatively heavy hyperon and the lighter K particle appear together when a proton smashes into a negative pi meson.

Discovery was made that atomic particles passing near an atom's nucleus set up waves on the nucleus' surface and these bulges travel around the nucleus at definite speeds.

Two out of three attempts to confirm the findings on which Einstein based his theory of general relativity failed.

International agreement was reached on new names for the fundamental particles of matter and a system set up for naming those yet to be discovered.

The sun was discovered to be the source of a very small percentage of cosmic rays bombarding the earth.

The Nobel Prize in chemistry for 1954 was awarded to Dr. Linus Pauling of California Institute of Technology for his work on the chemical bond and on the nuclear forces that hold all matter together.

The Nobel Prize in physics for 1954 was awarded jointly to German-born Max Born and Walter Bothe of Heidelberg, West Germany, for fundamental research in quantum mechanics and for discoveries resulting from coincidence counting, respectively.

MEDICAL SCIENCES

Death Rate From Cancer Double Among Smokers

More than double the death rate from cancer and nearly double the death rate from coronary artery disease was found among heavy, pack-a-day or more cigarette smokers compared to non-smokers in a two and a half year statistical study of 187,766 men aged 50 to 70.

The Tobacco Industry Research Committee was formed to finance research on the relation of tobacco smoking to health.

Chewing tobacco and snuff were reported associated with cancers of the mouth.

A million and a half U. S. grade school children took part in mass trials of a vaccine against poliomyelitis; evaluation of the test is due for announcement in 1955.

Experts failed to find beneficial effects of mass inoculations with gamma globulin on spread or severity of polio.

A chemical that can step up the anti-nerve gas action of atropine two and one-quarter times was discovered in pentamethonium, short for pentamethylene bistrimethyl ammonium dibromide, relative of one of the newer drugs for lowering high blood pressure, hexamethonium.

Parrot fever and ornithosis can be kept from spreading to humans by treating bird-breeding stocks with the antibiotics chlortetracycline or tetracycline.

A ban on routine use of oxygen for premature babies was advised to prevent blinding retrolental fibroplasia.

The year's new drugs for controlling high blood pressure were: pentapyrrolidinium, alseroxylon, andromedotoxin, Su-3088, or dimethylaminoethyl tetrachloroisindolene bismethochloride, and a combination of apresoline and serpasil.

Running hot or cold water into a balloon in the stomach was reported as a simple, safe method for quickly changing body temperature

that is adaptable to treatment of fever or freezing conditions, as well as for operations on heart and great blood vessels.

Running ice water or ice-cold salt water into the chest cavity was reported as simple and safe method of refrigerating patients for operations on heart.

A blood-pressure-reducing rauwolfia drug, called serpasil, was reported helpful in calming excited mental patients and potentially capable of improving their mental condition.

Chlorpromazine was reported effective in quieting disturbed mental patients, stopping intractable hiccups and augmenting the effect of narcotic drugs in relieving pain in cancer and other conditions.

Chemical analysis of opium ash was found a means of detecting the geographic origin of opium and a consequent aid in opium traffic control.

For saving victims of barbiturate overdosage, a mixture of beta beta methyl ethyl glutarimide, or NP 13 for short, with 2-4 diamino-5-phenyl thiazole was developed.

The human heart's "equipment" for a lifetime of beating without prolonged rest was discovered to consist of extremely small fibers, called sarcomeres, within the heart muscle filaments.

A blister and burn pain chemical was discovered in blood plasma.

Positron annihilation and a coincidence-counting system were used to develop a method for early detection of brain tumors with radioactive arsenic.

Patients whose eyesight is threatened by tears or holes in the retina can be helped by treatment with intense light, it was reported.

An anti-tuberculosis vaccine from powdered dead germs and a double drug combination, isoniazid with pyrazinamide, for eradicating the germs from the body were announced.

Glutamine and asparagine were tried with promising results in a new attack on epilepsy based on the discovery that failure to keep enough glutamic acid in the brain cells is most important of the three biochemical defects causing epilepsy.

Blood plasma expander from *Bacillus subtilis* was reported ten times more effective than serum albumin for attracting water into blood stream and, therefore, promising for treating burn-shocked patients.

The earliest human twin embryos ever seen, 17 days old from time of conception, were discovered and identified as identical twins formed inside a single blastocyst.

Unusual births included head-joined Siamese twins and a two-headed, four-armed baby.

A woman with Rh negative blood whose mother had Rh positive blood is likely to develop some tolerance to Rh positive blood, it was reported.

Cross circulation, in which patient and donor are linked artery to artery and vein to vein with pumps to control the blood transfer, was developed and used 21 times for operations on the temporarily blood-free heart.

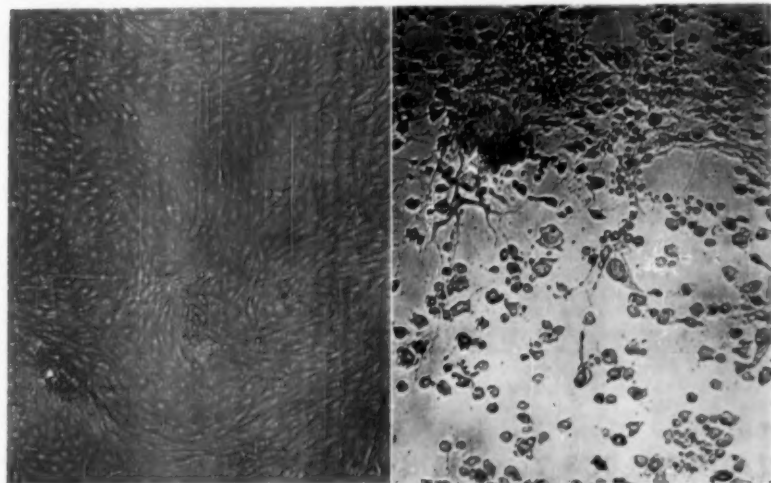
A single diet was designed for nourishing all forms of life, from man to bacteria, viruses and plants.

Tips of lung arteries were found to act as "catch-traps," holding masses of sludged blood cells.

A remodeled sulfa drug, called Diamox, already known to be a good diuretic, was reported helpful in the serious eye disease, glaucoma, and chronic emphysema of lungs.

The successful transplantation of an unerupted wisdom tooth to replace a lost first permanent molar was reported in more than 100 cases.

Success in grafting frozen male sex glands



POLIO DAMAGE—On the left are shown live cells from monkey kidneys clinging to the walls of a test tube. The picture on the right was taken 48 hours after live polio virus had been added. The virus attacks the cells, drawing on them for nutrition. The cells become enlarged and misshapen, and finally burst and disappear, releasing more virus to attack other cells. Dr. H. Fieldsteel of the Pitman-Moore Co., Indianapolis, took these photographs.

in rats hinted possible success in future human gland grafting.

Benzpyriminium bromide, a cholinergic agent, was reported 100% accurate in detecting early pregnancy.

A new pain-relieving drug, MRD-125, or Dolitron, that does not put the patient completely to sleep was announced.

The first serial cultivation of normal human cells directly on glass in a liquid medium was announced.

The first service-connected case of leprosy in a World War II veteran was discovered, causing prediction of more to come.

The development of an electronic magnet for removing particles of non-iron metal fragments from eyes was announced.

The first "atom-bomb-proofed" building in the nation's capital is the Armed Forces Institute of Pathology building at Walter Reed Army Medical Center.

The 1954 Nobel Prize in medicine was awarded to Drs. John F. Enders and Thomas H. Weller, Children's Medical Center, Boston, and Dr. Frederick C. Robbins, Western Reserve University School of Medicine, Cleveland, for success in growing poliomyelitis viruses outside the human body in non-nervous tissue culture.

Toxoplasmosis was shown to be a cause of granulomatous uveitis, a blinding eye disease, and 25 out of 29 patients benefited from combined therapy with pyrimethamine and sulfadiazine.

Metacortandracin and metacortandralone, new synthetic crystalline steroids, were found to be several times as effective as cortisone in rheumatoid arthritis and without significant side effects.

In the microsomes of liver cells, a metabolic system was discovered that accounts for the body's inactivation of the vast majority of drugs.

PSYCHIATRY-PSYCHOLOGY

Nose Can Serve As Chemical Analyzer

Evidence was found that color and brightness are received by the same elements in the eye, but are transmitted to the brain over separate, branched pathways.

Among the cones of the eye are some that are particularly sensitive to violet light, experiments demonstrated.

The nose can serve as a chemical analyzer, identifying the component parts of an odorous mixture, it was found.

Vision takes place, much as the picture is formed on a television screen, by the tracing of a series of light signals, with the alpha rhythm of brain waves governing the timing of the signals, it was suggested.

The theory was proposed that the rods of the eyes are made up of compartments, each of which is discharged by a single quantum of light and cannot be restored until all its rhodopsin is back to normal, explaining why the sensitivity of the dark-adapted eye is lost in such big jumps.

Depth or distance between two objects is seen in two different ways, experiment showed. One method, precise and quantitative, depends upon the difference between the two images received through the two eyes and the anatomical arrangement of the two eyes and the brain; the other, more subjective and vague, depends upon previous experience and is aided by movement of the eyes.

Love of exploration and manipulation is a powerful motive governing monkeys, and presumably also humans, that has generally been

neglected by psychologists, it was reported.

A machine was developed for efficiently teaching children arithmetic, spelling and reading by providing immediate reward for a correct response.

Hunger and thirst are interrelated, it was shown by experiments on pigeons when thirst ruined their appetite and over-drinking brought expressions of hunger.

"Cognitive conditioning," or the production by conditioning of a generalized attitude or frame of mind that is basically unconscious, was demonstrated.

Soft living under civilized conditions may make men physiologically unfit for rough life or combat, experiments with wild and laboratory rats suggested.

Soldiers who make the best fighters in combat were found to be characterized by all-round superiority, mentally, physically and socially.

Experiment revealed that effective leadership depends upon acceptance by followers as well as on special qualities or skills of the leader, and different tasks may require different relationships between leader and led.

Keeping the muscles tense was found to be no particular advantage or disadvantage in learning to perform a psychomotor task.

Rats gentled as babies were found to stand stress better when grown than those not gentled, probably due to decreased ACTH output.

When old people with senile dementia lose their ability to understand difficult words, it is due to localized brain damage in addition to the generalized deterioration of age.

Masculine men and feminine women do not differ significantly in their response to sex symbols when they do not understand the purpose of the test, it was found.

The Rorschach test was successfully used to distinguish schizophrenic patients from neurotics.

A test of the meaning of concepts, called the Semantic Differential, was shown to be very promising for evaluating personality changes with psychotherapy.

Internal conflict was shown to be connected with awareness of relevant pictures exposed very briefly.

The frequency at which a light must be flashed to be seen not as a flickering but as a continuous light was found to be significantly higher and less variable for schizophrenic patients than for parietic patients (with brain damage).

A double slot machine, operated through co-operation between two persons, was found capable of measuring the improvement of mentally ill patients and of stimulating the improvement.

Apathetic or stuporous mental patients were restored to interest in their surroundings by group therapy.

Brain injury in a newborn baby was successfully diagnosed by his response to a mild electric current applied to one leg.

The cause of many cases of mental illness of obscure origin was found to be horse sleeping sickness.

EARTH SCIENCES

Discover Plant Fossils 2,000,000,000 Years Old

Study of the tritium content of various samples of water showed that falling rain has stayed aloft as moisture for about three weeks, that deep wells and volcanoes can produce ancient water more than 50 years old, and that rain mixes with ocean water only to a depth of about 150 feet.

Primitive plant fossils more than 2,000,000,-

000 years old were discovered on the northern shore of Lake Superior.

A rare mineral, named ordonezite, was discovered in a Mexican tin mine; an even rarer mineral, mosesite, was rediscovered in a Mexican mercury mine.

A golden-brown gem stone, named sinhalite, was found in Ceylon.

International cooperation in observing worldwide geophysical conditions, including polar region phenomena, was planned for 1957-58, to be known as the International Geophysical Year.

Evidence was reported that the Arctic ice pack rotates in a clockwise direction, promising future problems regarding sovereignty over floating weather stations and military bases.

A theory was advanced, and confirmed by laboratory experiment with beakers of boiling water, that tiny bubbles in the molten lava trigger the eruption of volcanoes.

Volcanic eruptions included one of Merapi in Java, famous as a man killer.

A volcanic eruption of a tiny island off the coast of Mexico that destroyed all but less than 200 plants of five species provided scientists with a natural laboratory in which to study plant migration and revegetation.

Oil deposits can be located by examining bacteria in the soil.

A numerical weather prediction unit was established to prepare weather forecasts with the aid of an electronic computer.

Research on rain making continued: seeding clouds with silver iodide sprayed from ground generators proved of limited value under ordinary atmospheric conditions, and research on bursting sea water bubbles suggested the use of common salt for seeding clouds under certain conditions.

A theory that nature uses meteoric dust for natural cloud seeding was suggested by a study of rainfall records that showed a tendency for heavy rain, if any rain at all fell, 29 or 30 days after the earth passed through a major meteor stream.

The earth's crust was found to be 4,500,000,000 years old.

Discrepancies in calculated ages of rocks found by the lead-uranium method were explained as due to anomalies among the various isotopic ratios.

Six hurricanes caused much destruction during the year; they included two that were particularly devastating in the New England area.

Earthquakes during the year totaled 215 of magnitude six or greater, including a particularly violent one that devastated Orleansville and neighboring villages in Algeria.

Two mountains estimated at 8,000 feet high were found in southern Venezuela just north of the equator, one entirely within Venezuela and the other on the border of that country and Brazil.

International agreement set the nautical mile at 1,852 meters, or 6,076.10333 feet.

ENGINEERING AND TECHNOLOGY

No Scarce Alloys In Heat-Resistant Metal

A highly heat-resistant metal that uses no critically scarce alloying metals was developed; it may replace some stainless steels in jet engines and, some day, may be as common as iron.

A coal-burning gas turbine locomotive was developed that may rival the diesel.

Surplus wheat was puffed into a strong, light, weatherproof, insulating wall board.

Pure, non-rusting iron crystals were achieved in the laboratory.

A plastic was developed that will withstand

temperatures encountered by airplanes flying many times the speed of sound.

Chemicals that bond plastic to glass were developed, thus making plastic cars, boats and airplanes more practical.

A machine that converts sawmill scraps into strong, warless board was invented; three men can operate it.

Work continued on an electronic aid for the blind; it is planned to use modulated light to detect obstacles, and will emit vibrations to signal a slowdown or other hazard.

A curb-climbing wheelchair for invalids was perfected.

The Army tried out television as a war weapon; cameras on the battlefield showed generals at headquarters how their strategy was progressing.

A television camera tube sensitive to X-rays was developed to help industries make X-ray pictures without film.

Ultrasonic tooth drilling without pain or audible sound was demonstrated upon human patients.

A high-speed tooth drill, driven by a tiny water turbine, was developed.

Titanium carbide, with a high strength at 2,000 degrees Fahrenheit, was developed for jet engines.

Tests using transistors in a new telephone system indicated that several conversations can be carried on at the same time on a single rural telephone line without interfering with each other.

PATENTS

Patents of the Year

Numbers following items are U. S. Patent numbers. Printed copies of patents can be obtained from the U. S. Patent Office at 25 cents each. Order by number, do not send stamps, and address orders to the Commissioner of Patents, Washington 25, D. C.

Notable and interesting inventions patented during the year included:

Chemical heating pads for GI battle clothes to keep soldiers warm for 290 hours. Patent 2,680,063.

Electrodes that harden reinforced concrete in 13 minutes, even at near-freezing temperatures. Patent 2,683,916.

High-voltage batteries, printed with polarized layers of metallic ink, to power printed radio circuits. Patent 2,688,649.

A quick, easy and efficient way of recovering uranium oxide from pitch-blende, carnotite, autunite or becquerelite ore. Patent 2,690,376.

A long-range supersonic guided missile having a fuel storage system that does not upset the missile's balance as fuel is used. Patent 2,690,314.

A camera for prospectors that can photograph underground radioactive ores to reveal the extent of the strike. Patent 2,688,095.

A way to give titanium metal a hard outer "skin" comparable to that of case-hardened steel. Patent 2,674,542.

A pulverized, mineral-enriched meat for babies who are allergic to cow's or human milk. Patent 2,673,803.

A tool that bores into mineral ores with a supersonic flame. Patent 2,675,993.

A steel alloy that can withstand temperatures of 1,500 degrees Fahrenheit in jet planes and gas turbines. Patent 2,677,610.

A talking dictionary, on magnetic tape, that also pronounces words through a loudspeaker. Patent 2,677,200.

A wartime radar that picks up only moving

Development of an ultra-high-frequency transistor was a step toward use of these tiny devices to replace a large array of vacuum tubes in radio sets, the transcontinental radio relay system, and submarine telephone and television repeaters.

Objects made of dry ice were tested in a supersonic wind tunnel to shed light on missile-cooling problems and the way meteors burn while plunging through the earth's atmosphere.

Bayonet-fighting tactics were revised for the first time since 1905 to increase survival and to save great amounts of energy.

A doughnut-shaped metal ring smaller than a shirt button was developed as a magnetic amplifier to govern huge machines.

A 110-watt fluorescent tube was developed that gives 35% more light than any previous fluorescent light source.

Plans were completed for an endless belt, linking Lake Erie with the Ohio River 100 miles away, to shuttle iron ore and coal overland.

Electronic computers were harnessed to such tasks as:

Forecasting amount of precipitation in advance of storms.

Routine office record-keeping.

Translating a foreign language into 85% sensible English.

Predicting how and when a flood upstream will hit communities downstream.

"Testing" the performance of jet engines and nuclear reactors while plans were still on drawing boards.

Science News Letter, December 18, 1954

PUBLIC HEALTH

Penicillin Success Hints Vaccine Against Syphilis

► POSSIBILITY OF vaccinating against syphilis appears in human volunteer studies reported by Dr. John C. Cutler of the U.S. Public Health Service, at the meeting of the American Academy of Dermatology and Syphilology in Chicago.

"First conclusive evidence" that humans develop immunity to syphilis after penicillin treatment for the infection was obtained in the studies with the 62 human volunteers infected by inoculation with syphilis at the New York State Penitentiary, Sing Sing, N. Y.

The results, Dr. Cutler stated, show that "significant immunity develops during the course of human syphilis. This confirms the concepts of immunity established in animal experimentation.

"The 15-month study also developed information suggesting the possibility that a vaccine might be developed to immunize against syphilis," he declared.

"An injection of killed syphilis organisms (germs) apparently protected part of the volunteers who previously had syphilis from being infected a second time when inoculated by live organisms."

The information, Dr. Cutler and associates said, is "far from conclusive but appears to be a step in the right direction toward the search for such a protective agent."

Associated with Dr. Cutler in the study were Drs. Evan Thomas and Lopo de Mello of the New York State Department of Health, Dr. Bernard Kaplan of the New York State Department of Correction, and Drs. Sidney Olansky and Harold Magnuson of the Public Health Service.

Science News Letter, December 18, 1954

VETERINARY MEDICINE

Find Insecticidal Spray To Control Cattle Grubs

► THE FIRST effective insecticidal spray for the eradication of the cattle grub, a highly destructive insect parasite of cattle, was described to the Entomological Society of America meeting in Houston, Tex.

Entomologists A. R. Roth and Gaines W. Eddy of the U.S. Department of Agriculture's Western Research Center, Corvallis, Ore., reported on the results of preliminary tests with the experimental phosphate-type insecticidal spray.

They cautioned livestock men, however, that until further tests are completed, cattle grub control should continue to depend on the standard rotenone, to which the new spray has proved an equal.

In the tests, the scientists found that a 0.5% spray of 3-chloro-4-methylumbelliferone, 0, 0 diethylthiophosphate, simply designated 21/199, applied to the backs of nine grubby cattle, killed all the grubs, 245, in less than a week.

Science News Letter, December 18, 1954

Science News Letter, December 18, 1954

Books of the Week

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

THE CHALLENGE TO MEDICAL EDUCATION—Robert M. Cunningham Jr.—*Public Affairs Committee*, Public Affairs Pamphlet No. 214, 28 p., illus., paper, 25 cents. More groups must accept an increased share of responsibility for the support of medical education, according to the author, if medical schools are to function most effectively in the future.

A DICTIONARY OF ELECTRONIC TERMS: Concise Definitions of Words Used in Radio, Television and Electronics—Gordon R. Partridge, Ed.—*Allied Radio Corporation*, revised ed., 72 p., illus., paper, 25 cents. Definitions covering modern techniques and equipment in this rapidly expanding field.

THE FIRST BOOK OF PREHISTORIC ANIMALS—Alice Dickinson—*Franklin Watts*, 92 p., illus., \$1.75. Telling young people about the animals that lived upon the earth before the coming of man.

FOG MODIFICATION BY COLD-WATER SEEDING—Vernon G. Plank—*Office of Technical Services*, Geophysical Research Papers, No. 31, 21 p., illus., paper, 75 cents. Investigating the possibility of dispersing fog or stratus by cold-water seeding, and discussing the physical factors that must be considered.



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GLUTATHIONE: Proceedings of the Symposium Held at Ridgefield, Connecticut, November 1953—S. Colowick and others, Eds.—*Academic Press*, 341 p., illus., \$7.50. Attempting to include all of the significant current information about this sulphydryl tripeptide and its use.

INTRODUCTION TO THEORETICAL MECHANICS—Robert A. Becker—*McGraw-Hill*, 420 p., illus., \$8.00. A text, designed for physics majors and first-year graduate students, with emphasis on problem solving.

LEARNING: Reinforcement Theory—Fred S. Keller—*Doubleday*, *Doubleday Papers in Psychology*, 37 p., paper, 85 cents. A simple and brief introduction to this theory, which provides an approach to modern psychology and the understanding of man.

MINERALS YEARBOOK 1952: Vol. II, Fuels—Fuels and Explosives Division, U. S. Bureau of Mines—*Govt. Printing Office*, 450 p., illus., \$2.25. Reviewing the industry as a whole, as well as presenting chapters on each mineral-fuel commodity.

PETROLEUM FACTS AND FIGURES—*American Petroleum Institute*, 11th ed., 322 p., paper, \$2.00. Together with the ninth edition, this book provides a statistical history of the oil industry dating from the earliest years for which comparable figures are available.

THE PLANT QUARANTINE PROBLEM: A General Review of the Biological, Legal, Administrative and Public Relations of Plant Quarantines with Special Reference to the United States Situation—W. A. McCubbin—*Einar Munksgaard*, 255 p., illus., \$4.80. The author was plant pathologist of the U. S. Dept. of Agriculture until his retirement in 1950. Published in Denmark.

THE PROCESS AND EFFECTS OF MASS COMMUNICATION—Wilbur Schramm, Ed.—*University of Illinois Press*, 586 p., illus., \$6.00. For students in the field of communication, especially those concerned with international communication, these pertinent articles have been collected.

SEASONAL TRENDS OF TEMPERATURE, DENSITY, AND PRESSURE IN THE STRATOSPHERE OBTAINED WITH THE SEARCHLIGHT-PROBING TECHNIQUE—L. Elterman—*Office of Technical Services*, Geophysical Research Papers, No. 29, 70 p., illus., paper, \$2.25. An overall representation of stratosphere conditions over New Mexico, based on the average of 90 sets of measurements.

SHARING IN OUR EXPANDING ECONOMY: Guides to Planning and Financing Company Progress—Gordon W. McKinley and others—*American Management Association*, Financial Management Series No. 107, 35 p., paper, \$1.75. Suggesting how those concerned with corporate finance can take advantage of indicated trends and certain benefits offered by new legislation and rulings, and by the activities of government agencies.

SILICA SAND RESOURCES OF WESTERN VIRGINIA—W. D. Lowry—*Virginia Polytechnic Institute*, Engineering Experiment Station Series No. 96, 62 p., illus., paper, 75 cents. Based on a survey made by the Virginia Engineering Experiment Station in 1951.

TREASURES OF THE EARTH—Fred Reinfield—*Sterling*, 156 p., illus., \$2.95. To introduce young people and hobbyists to the beauty and wealth that exist beneath our feet, and telling how to start on the engrossing pastime of collecting minerals and rocks.

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Questions

AGRICULTURE—How do wind tunnels help fight soil erosion? p. 386.

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BIOLOGY—What could be results of discovering artificial photosynthesis? p. 387.

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ENTOMOLOGY—How may the fly problem in cities be eliminated? p. 386.

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NUTRITION—What is dehydrofreezing? p. 389.

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PSYCHIATRY—What may be cause of mental depressions at Christmas time? p. 386.

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Photographs: Cover, Commonwealth Scientific and Industrial Organization; p. 386, Hawaiian Sugar Planters' Association; p. 390, Convaire; p. 392, Northrop Aircraft, Inc.; p. 393, Carnegie Institution of Washington; p. 394, Batelle Memorial Institute; p. 395, Pitman-Moore Company; p. 400, Eastman Chemical Products, Inc.

ENTOMOLOGY

Melon Output Increases Where Bees Congregate

► INVITING HONEY bees to live next to a cantaloupe field can mean almost twice as many melons per plant at harvest time.

In a study of 37 melon fields made in the Salt River Valley of Arizona, where growers have known for some time that honey bees are necessary as pollinators, it was found that honey bees living next to a field can increase the average per acre output by 81 crates of melons.

Reporting to an Entomological Society of America meeting in Houston, Tex., Edgar A. Taylor, a U. S. Department of Agriculture entomologist, stated that the study also showed that in fields without nearby hives, each plant produced an average of 0.6 cantaloupe, whereas, with bee colonies close by, the plants bore an average of 1.06 melons each.

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BOTANY NATURE RAMBLINGS



Christmas Trees

► THIS IS the season when 28,000,000 little trees are brought into 28,000,000 unseasonably warm front parlors and loaded down with enough tinsel, twinkling balls and colored lights to build a glittering highway from earth to the moon.

The little evergreens never flowered when they grew out of doors. Suddenly they sprout bright candles or complete electric systems for blossoms. Apples, oranges and candy canes appear in their boughs in a burst of fruit. It takes real magic for such things to occur. But this is a time of benign magic.

Christmas trees, like many other things which decorate homes at Yuletide, are older than Christmas itself. They were first used in lands far from Bethlehem. They belong to the North, to dark and savage

lands beyond the Rhine and the Danube.

The favorite Christmas tree in America is the spruce. There are several types of spruce, but they all can be spotted by their short, sharp, prickly needles, each one standing on a miniature pedestal by itself. Their small cones hang downward.

Then there is the fir, close cousin of the spruce. Firs have softer needles, usually curved, and their cones stand straight up.

Pine trees, often used at Christmas, can be told from spruce or fir by the fact that their needles come in bunches or pairs instead of singly. White pines always have fine needles in a bunch. The various yellow pines have less than five—usually two.

Red cedar has very fine, feathery branches of small pointed leaves. Arbor vitae, a relative of the red cedar, has leaves flattened into tiny scales which completely cover the twigs on which they grow.

Gigantic is the merchandising machine which brings millions of these trees from mountain forests to city street corners, all within the brief month between Thanksgiving and Christmas Eve.

Yet only in rare instances does this mighty splurge of woodland cutting hurt the forest. If the Christmas tree marketer cuts selectively, his thinning helps the remaining trees to grow, trees which might otherwise have died from crowding.

Many families do not buy a cut tree at all, but have instead a small spruce or fir planted in a tub. They use it as a perennial Christmas tree, bringing it indoors each December, sinking the tub in the garden during the remainder of the year.

Children and tree grow together, until one day the parlor ceiling is suddenly too low. The magic still lives, but the tub is outgrown.

Science News Letter, December 18, 1954

VETERINARY MEDICINE

Cattle Disease End Seen

► ANAPLASMOSIS, WHICH costs American cattlemen an estimated \$10,000,000 annually, may soon be brought under control and eradicated by means of large-scale testing never before possible.

A way to produce in quantity the material needed for the "complement fixation

test" that detects the disease in cattle has been announced. It was found after ten years of research by federal and state animal pathologists.

Anaplasmosis, like Texas fever that was eradicated some years ago, is caused by a protozoan parasite that destroys red blood corpuscles. The test uses antigen, an extract of the disease parasites from the red blood cells of infected cattle, to detect the disease in other cattle. It is described by U.S. Department of Agriculture scientists in *Agricultural Research* (Dec.) as being similar to the Wasserman test for human disease.

The disease is harmless to man either through contact with infected animals or by eating infected meat, the Department reported. Cattle, however, suffer from high fever, anemia, a loss in weight and a termination of milk flow. It is now hoped that the disease can be checked through planned large-scale tests and the finding of control measures.

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• New Machines and Gadgets •

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Science News Letter, December 18, 1954

❁ **TOURIST LOCK** is designed to hold the keys and chain in a leather pocket case when not in use. The chain is 18 inches long and is attached to a snap lock. The lock can be used by itself or with the chain to guard one or more pieces of luggage.

Science News Letter, December 18, 1954

❁ **DACRON PAINT-ROLLER** holds 27% more paint than the average roller. The plastic fleece cover of man-made fiber will not mat or wilt, and beveled edges permit closer rolling to baseboards and trims without smudging.

Science News Letter, December 18, 1954

❁ **ALL-STEEL DOORS** for double garages are 16 feet by seven feet and eliminate the need for a center post. Opening up and over, the steel is galvanized with a heavy zinc coat to protect it against rust.

Science News Letter, December 18, 1954



❁ **TODDLER CHAIR** stands 30 inches high and has a chrome frame, as shown in the photograph. Going modern, youngsters can now sit at the table in a sturdily built chair with plastic bucket seat. The seat is molded of a durable chip-proof butyrate plastic which is easy to clean.

Science News Letter, December 18, 1954

❁ **TAPE RULE** for the home carpenter as well as the professional is extra wide and extra long, and has a double scale, one providing inches and feet and the other, continuous inches. This flexible steel, pull-push rule is over 10 feet long and $\frac{1}{4}$ inch wide.

Science News Letter, December 18, 1954

❁ **RIBBON-TIES ARE** ready made to snap around a gift package in five seconds. The plastic loop is stretched over one corner and then across the back of the package to be slipped over the diagonally opposite corner. The bows are heat sealed.

Science News Letter, December 18, 1954

❁ **SLIP-PROOF LIQUID**, a few drops of which are sprinkled on the dry surface of a bath or shower, is described as providing a thin chemical film that prevents slipping. Tested as harmless, the invisible safety film is removed with any ordinary household detergent.

Science News Letter, December 18, 1954

Do You Know?

It takes 250 tons of water to make a ton of steel or a ton of sulfate wood pulp.

Only one human cancer, the rare *condylo-ma acuminatum*, is known to be caused by a virus.

One species of fresh water shrimp in southern Florida grows to a length of two feet.

The *chinchilla* is a South American rodent that was practically unknown in North America until 1923.

The throat and ears of a *beaver* are equipped with valves that voluntarily close when the animal dives under water and open when it surfaces.

Scale, one-quarter of an inch thick, deposited in the common three-quarter-inch pipe, reduces the flow of water to 11% of what it should be.

Horses, which became extinct in North America, were reintroduced by the Spanish in 1519, when they brought 16 horses with them from Havana.

When production of electricity from the atom reaches a total of 100,000,000 kilowatts, which for the free world may be near 1980, about 5,000 tons of *uranium* will be required annually for replacement on the basis of two percent burn-up.

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